

A School District's Adoption of an Elementary Science Curriculum

The author describes how case study methods were used to understand the intricacies of curriculum adoption in one school district and the context in which an adoption decision was made. As data collection and interpretation commenced, understanding of the perceptions of the district stakeholders of their process of curriculum adoption became an emerging concern.

What is the process a school district uses to choose an elementary science curriculum? The process as stated on paper seems straightforward and objective. For example, agreed-upon criteria are used to evaluate textbook series. Many resources are available to assist in such a process: The National Academy of Sciences and National Science Foundation both offer resources to aid in the selection of curriculum materials, not to mention the National Science Education Standards and Project 2061 Benchmarks. However, many schools continue to choose curriculum materials that are considered dubious?

Tyson and Woodward (1989) report that "textbooks structure 75-90 percent of classroom instruction," (p.14) yet few studies describe elementary science adoption processes by schools. Kelly and Staver (2005) assert that "there exists a dearth of curriculum adoption and implementation studies in the literature; consequently, far too little is known about what happens as science programs are implemented in schools" (p.27). Ball & Cohen (1996) described curriculum materials as

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"the stuff of lessons and units, of what teachers and students do" and describe curriculum materials as "part of the routine of schools" and "at the local level, textbook adoptions are the primary routine in most districts for updating curriculum," yet "the relationship between textbooks and teachers has rarely been taken up with much care or imagination" (p.6). Stein, Stuenkel, Carnine & Long (2001) examined statewide adoption practices and found that most research about the adoption process was published in the 1980s. Studies do exist which examine the quality of textbooks (e.g., Kesidou & Roseman, 2002), but recent research in elementary science adoption processes is limited, focusing instead on the implementation of new curricula (Cannon & Crowther, 1997; Kelly & Staver, 2005). This case study set out to examine one

school district's elementary science curriculum adoption process and the context in which an adoption decision was made.

Methods

Case study methods were used to understand the intricacies of curriculum adoption in one school district. This study developed from an initial inquiry that sought reasons for River Valley's rejection of National Science Foundation-sponsored curricula in favor of a more traditional text-based curriculum. However, as data collection and interpretation commenced, understanding of the perceptions of the district stakeholders of their process of curriculum adoption became an emerging concern. The district curriculum adoption process became the "bounded system" (Stake, 1997) of this case study. As such the focus of this study is the adoption of an elementary science curriculum. It is not a "search for what is common, pervasive and lawful" but for "understanding of the particular case, in its idiosyncrasy, in its complexity (Stake, 1997, p.405).

The committee developed curriculum maps for each grade level.

Data Sources

Interviews.

Interviews were conducted with members of the Elementary Science Committee, including the two co-chairs of the committee. The Director of Elementary Education, the administrator in charge of the curriculum adoption, was also interviewed. Finally classroom teachers were interviewed to understand their perceptions of the adoption process. These interviews were transcribed for analysis.

Observations.

Observations of a textbook publisher's presentation was recorded in the form of field notes to gain an understanding of the decision-making process.

Documents

All documents pertaining to the adoption process were made available and became part of the data set. Documents included results from the Science Committee's own evaluation forms and feedback from teachers on the final two proposed curricula. Teachers' feedback was in the form of tabular results from a survey and open-ended questions. District grade-level curriculum maps developed by the Science Committee were also examined, as were publicly available documents relating to district demographics.

Data Analysis

A grounded theory approach as described by Strauss and Corbin (1998) was used for data analysis. Data were

analyzed by a series of coding. Initial coding was used to develop common elements across the data. Subsequent coding led to provisional themes which guided further data collection. Themes reported here were central to many of the categories developed through coding and may have implications for a more general theory of curriculum adoption processes. The data are reported here in the form of a case study with a discussion of the emergent themes at the end of the chronological narrative. To the degree possible, participant quotes are used to tell the story; however, the story told here is my own, based upon my own interpretations of the data.

Setting

River Valley School District (pseudonym) is a K-12 school district with approximately 12,000 students employing over 1600 teachers and support staff with an approximate yearly budget of \$90 million. The district has a student body which is approximately 75% White, 12% Black, 5% Asian/Pacific Islander and 5% Native American. The low-income rate of approximately 24% is based upon students from families who receive public aid, live in institutions for neglected or delinquent children, are supported in foster homes with public funds, or are eligible to receive free or reduced lunches (State of Illinois definition). The district has been growing for several years. Between 2006 and 2010 enrollment is projected to continue to increase at a rate of nearly 3% per year. Three new elementary schools and one new middle school are currently in the planning stages. Most district challenges relate to the growth of the district in recent years.

Terminology

The interchangeable use of the terms curriculum adoption and textbook adoption is deliberate and is consistent with the use of the terms by the participants. It can be argued that a formal curriculum can differ substantially from an implemented curriculum or the instructional procedures of classroom teachers; moreover, participants made no such distinctions. Similarly, River Valley came to see curriculum planning as akin to the textbook adoption process.

The Process

River Valley School District is located in Illinois, a state where curriculum adoption is entirely a local decision. The State of Illinois only regulates prices to be paid by districts by demanding curriculum developers file a sworn statement with the state indicating they are bonded and will not charge Illinois school districts more than other districts nationwide (Illinois School Code 105 ILCS 5/28-1) – requirements easily met by scores and scores of companies selling instructional materials.

Curriculum adoption, at the elementary level, was overseen by River Valley's Director of Elementary Education – an administrator from the central office who reports to the Assistant Superintendent for Curriculum and Instruction. The typical curriculum cycle in River Valley is 10 years. The process of adopting a new curriculum takes two years. Barbara, the Director of Elementary Education during the science curriculum adoption process, described the typical adoption of a curriculum as one year to discuss best practices, articulation and curriculum mapping and one

year to choose the curriculum. Jean, a veteran third-grade teacher and one of the elementary science committee co-chairs, described the process for choosing the science curriculum:

This is usually a 10 year process where you have a textbook, like our last science books we had for 10 years. Two years before, in the eighth year of the series ... you get a task force together and they try to have each grade level K-5 represented. They [central administration] try to have equal representation. They try to get the schools represented; they try to get the grades represented.

I think we met 4 times the first year where you are getting some ideas for series and then you start to look at some of those series, you get a few samples sent in and then you narrow it down to maybe 2 or 3 and then those companies come, they have presenters come show you all the different stuff like they are selling their product.

Abby, a veteran kindergarten teacher and the other elementary science committee co-chair recalled spending time during the first year of the adoption process examining the standards to be better prepared to select a curriculum.

Choosing the Committee

Barbara had primary responsibility for forming the elementary science committee and was pleased that Abby and Jean would co-chair the committee.

We are fortunate in this district we do have curriculum chairs at the elementary level. Two curriculum chairs for the whole district. It is a paid position but

it is a miniscule amount of money and they don't get release time so they are still full-time classroom teachers and they just have more work to do and a small amount of money for doing it. But they are also extremely knowledgeable in the area of science because I will be the first to admit that science is not my area and the committee did look to those ladies for guidance in terms of: is this good material, is this grade appropriate, and they did a wonderful job of leading and guiding our committee.

Filling out the rest of the committee was also charged to Barbara:

We sent out a call for volunteers and in some buildings we had more volunteers than we could use and in other buildings we had to shake the bushes a little bit and so I was allowed, with the permission of the Assistant Superintendent of Curriculum and Instruction, to cull the list in those buildings where we had more than we needed and I was allowed to shake the bushes I wanted to shake in those building where we needed more people, and I did so.

Criteria for Choosing the Curriculum – Narrowing the Choices

More Depth – Less Breadth

The first year, the committee developed curriculum maps and planned the adoption process; it was the job of the committee to narrow the possible choices of curricula to two or three before seeking input from all teachers. Barbara and the Science Committee used the following criteria

to select a manageable number of curricula to be presented to teachers.

The basic commitment of the committee, from the beginning of the program, was the idea of “more depth, less breadth.” As Barbara described it:

One of the things that really came out [of school-level science meetings] was we were skimming lots and lots of topics and not giving depth and that was the other thing the elementary science curriculum can include more depth rather than breadth. That was a key issue.

And Abby, a science committee co-chair:

We had originally thought that we wanted something that really went deep into one subject area at a time and we would really focus on that.

Barbara did not want teachers to see components of the curriculum they were not going to receive.

Standards and Testing

While ‘less breadth, more depth’ was a consideration, participants’ discussion of the criteria for choosing the curriculum was dominated by how well the new curriculum addressed, and used the language of the Illinois Learning Standards. Abby described her perceptions of the influence of state standards and tests:

They [teachers] wanted to hit some of those topics they know are on the ISATs [Illinois Standards Achievement Test] and these tests, that was a big

concern and that was one of the things that as a task force that we looked through to see. So we would look at the series to make sure that those things were covered for the student, to make sure they had been exposed to those things before they took the test. So that was a big, big concern.

We first tried to talk about the standards and what we would look for in a new series. We really just wanted to make sure we hit all the standards and this one had textbooks directly written for Illinois state standards, which was really a big plus for that and I think that was why it was chosen.

But we wanted to make sure ... and we were ... you know originally we were saying we have to make sure we cover the standards so let's write this [curriculum maps to outline the standards]. But then when we found that they had the standards already in it we didn't need to do it that way. It was a lot easier to do. Nobody wanted it to be a unit that just followed a book, you know, we want to create our own curriculum and then find something to support it but we felt that this series really did incorporate all the different things we were looking for.

(Tony: Your text series was chosen over the others because of this standards issue?) It really seemed that most of the teachers felt that that was the easiest way. You know there were a lot of appealing features to it but the standards were really a main focus for this. We really wanted

to make sure the standards were right there for the teachers because that's been such an issue - our teachers teaching to the standards. We really wanted to get away from those lessons that teachers just were doing because they like to do them, which is still a problem, you know, it really isn't in their curriculum at all anymore, and so, that is really not following the standards at all, so we wanted something that really you could not not teach to the standards.

At the beginning of the school year all teachers were required to attend training sessions.

Barbara, Jean and Sharon (a Science Committee member) confirmed in their interviews the primacy of the state standards and tests for the selection of the science curriculum. Barbara, a longtime administrator was surprised at how standards- and test-savvy her teachers had become:

And the teachers were more aware than I realized of even the kinds of questions on the Stanford Achievement ... not the kinds of questions but the topics that were addressed on the Stanford Achievement Test and, again, I have been out of the classroom long enough that I couldn't tell you that in second grade they were asking these kinds of questions. In sixth grade these kinds of questions and in our series now we don't even get to this topic until this grade. We at least need a series that addresses it at the right time. And that was

interesting to me that they knew that. It goes to show how test aware our teachers have become. Not just of ISAT but of Stanford Achievement Test as well. It's gotten out of control.

Copyright Date

The data revealed other criteria that were important to the committee at this juncture of the process. The adopted curriculum would have a ten-year lifespan. Given that lifespan, Barbara would only consider curricula with a copyright date of no more than two years from the time of adoption.

We eliminated things that had a copyright date that were two years out. Again, knowing that we had ten years that we were going to keep this, then we were down to five. That made it relatively easy.

Professional Development

Since many teachers in the district were not "content comfortable" in science the committee felt that ongoing professional development for the life of the text series in the district (10 years) was important and something that Barbara wanted in writing from the publishers.

... there also had to be a component of ongoing professional development. That was promised to our teachers. Not just for the first year, but for the life of the series because the other thing the teachers told our committee was we always get professional development the year that a series is adopted but as new folks come on they never get that and it is "figure it out on your own" and traditionally we have a series for 10 years. And when we are hiring 100 new

teachers a year, you have a lot of people who don't know how to use the materials.

A teacher hired seven or eight years from the adoption year was entitled to free professional development from the publisher. The professional development is best described as an introduction to the curriculum materials. Only publishers willing to guarantee such professional development would be considered finalists for curriculum adoption.

Influence of Social Studies Curriculum Adoption

Finally, only textbook series were considered for adoption. Kit curricula such as Full Option Science System (FOSS), Insights, and Science and Technology for Children (STC) were *eliminated early on* (Barbara). The last curriculum adopted in social studies was a kit curricula and implementation of those materials did not go well. As Barbara put it:

We went the non-text route with social studies and it turned into a veritable nightmare and our curriculum committee said we are not going down that street. We are not going to be held responsible for a non-text curriculum. We are not going to get beat up the way those poor social studies people did.

As we narrowed things down and knowing what their [the Science Committee] colleagues would and wouldn't use, they eliminated some things right off the bat and FOSS was one.

Jean concurred:

I am a firm believer anymore in textbooks after seeing what happened with the social studies.

Absence of Research and Outside Influences

None of the participants mentioned any reliance on research or resources related to science curriculum adoption or best practices. The participants said that Barbara had given them a notebook with articles to be read; however, when I asked Abby if she had any professional development related to curriculum adoption she said

There wasn't any formal training, [Barbara] just would say, okay, this is our goal, this is what we need to do, this is where we are headed, you know today we are going to do this. She really step-by-step led us through that process. She didn't lead us through the answers but what do we want to look for.

Taking into consideration these main ideas—"more depth/less breadth," alignment of curricula to the Illinois Learning Standards, a copy-right of no more than two years old, on-going professional development for new teachers, and no kit-based curricula—the committee narrowed the choice to two textbook series to present to all teachers for their input.

Making a Decision

Who's in Charge?

Barbara, as Director of Elementary Education at River Valley, was the administrator charged with curriculum adoption in all content areas at the elementary level. As such, the adoption of a science curriculum was her responsibility. She was hesitant to take too much credit for the process and decision:

They [the science curriculum co-chairs] did a wonderful job of leading and guiding our

committee in that area—though again, we had passionate science people on the committee so they know what they were talking about and in that area I looked to them for direction. My role was really keeping the group moving forward and then doing the negotiation to make sure the teachers got what they needed.

However other task force members characterize Barbara as very much in control of the process:

Barbara met with us, when we first started, she told us what we needed to look for. We had the Illinois Standards, we had the criteria that we had come up with that we thought would be a valid checklist, so as far as that training goes, yes. Outside people coming in and training us? No, but Barbara did. (Jean)

I was on the task force and the chair but she really did all that behind the scenes and talking to the different companies and kind of leading us in the right direction. (Abby)

I didn't really head the task force, she [Barbara] did that. (Abby)

Barbara had it narrowed down to four or five before she brought it to the task force ... We didn't go out there and search as a task force. Barbara brought just, I think there were five, in the beginning and the task force limited it to three and let the teachers choose among the three but it ended up being that no one wanted the third, which I don't even remember what it was anymore, she just, we just presented two to the teachers. (Abby)

Barbara narrowed down the curriculum choices and I don't know what criteria she used. I imagine she would be helpful for you to talk to. (Sharon)

No one seemed willing to take responsibility for the curriculum adopted. Barbara described herself as a facilitator, while committee members described her as making most decisions. All participants do agree that Barbara narrowed the curricular choices for the committee to examine by excluding for consideration any curriculum that had a copyright two years or older, lacked professional development or was kit-based. This effectively narrowed the choices to five similar textbook-based curricula. Barbara also provided the training the committee members received.

Preparations for Making the Decision

There was little professional development provided to the committee about science curriculum adoption. When asked about resources used and training provided Barbara replied,

We also really looked at the resources we had in place and talked about what's good about what we have, what's bad about what we have, what are the practices currently in place and what are we missing. The committee talked about what they were doing and then they went back and held meetings with their staff to provide input. We garnered some really good information from the staff in terms of what is good about science in River Valley and what is bad about science in River Valley. And that also helped in terms of giving us a little bit of direction of what we needed.

The committee did not use resources from professional organizations or the research literature to become better informed about making curricular decisions. For example, Project 2061 has a curriculum evaluation tool (Roseman, Kesidou, S. and Stern, 1997) for choosing curricula that is aligned to AAAS Benchmarks (American Association for the Advancement of Science, 1993) and National Science Education Standards (National Research Council, 1996). It appeared that River Valley felt it had enough information about elementary science curricula to proceed.

There was preparation for evaluating the curricula. The committee developed curriculum maps for each grade level. These maps outlined what concepts would be taught at each grade level and what learning standards were addressed. The maps were to be used to assist in the curriculum decision making by finding which curricula most closely matched the curriculum maps. However, when the committee compared the initial drafts of their maps to the final two curriculum choices, neither curriculum matched up very well to the curriculum maps. So, the committee changed the curriculum maps. As Abby related,

Nothing matches something that you just create so we ended up doing it the other way around and it was a lot easier. But we wanted to make sure ... and we were originally saying we have to make sure we cover the standards so let's write this now. But then when we found that they had the standards already in it we didn't need to do it that way. It was a lot easier to do. Nobody wanted it to be a unit that just followed a book, you know, we want to create our own curriculum and

then find something to support it but we felt that this series really did incorporate all the different things we were looking for.

And Jean:

We didn't really go and fill that in until we figured out which series because we wanted it to obviously match the series. It [the curriculum maps] really states what you're going to teach and what resources you have, so the curriculum really was written after the fact of the adoption. Originally we thought it would be the other way around—we would write the curriculum and then find a series that matched it.

The Publishers

Five publishers met with Barbara and the Science Committee initially to present their textbook series (by this time a kit-based curriculum was out of the question). The publisher's presentation I attended, which participants concurred was very similar to the presentations of all the publishers, took place in a classroom that had been prepared by the sales staff. Rich-red tablecloths covered the classroom tables. Three tables on the periphery of the classroom held displays of the text and teacher resource materials, science equipment, and consumables that could be purchased and a display of the technology resources available. On a middle table was the fully-catered meal the publisher was providing the science committee: salads, sandwiches, bagels, muffins, cookies and drinks. While the teachers entered the three sales staff engaged in small talk, primarily about the food. After the teachers filled their plates the projector was turned on and the sales presentation commenced.

Without any significant professional development or curriculum guidance from the district for a number of years, a laissez-faire system evolved for elementary science: Teachers did as they pleased.

The sales staff began by telling the committee how the text series was based upon the professional literature, national standards and the research conducted in the development of the curriculum. The committee was then shown how the Illinois Learning Standards were integrated into the curriculum, which included the text, teacher resources, and online materials. How the publishers dealt with the reading abilities of students was discussed; not only the text series but the leveled readers that supplemented the text. In this case, small paperback books summarizing material in the text were available for students reading above, at and below grade level. Supplemental materials and technology resources were then presented. The committee was shown equipment tubs with place mats that had lined drawings of the equipment to be laid on them for an activity; audio readings of the text; parent resources; and technology resources such as an online text, test bank (including questions formatted to the style of the Illinois Standards Achievement Test), and movie clips. Finally, the teachers left with a tote bag full of gifts and preview materials from the sales staff.

A Problem

After presentations from the publishers the committee narrowed the selection to two text series that would be presented to all elementary teachers in the district. However, there was a problem: none of the curricula met the goal set by the committee that the new curriculum should represent more conceptual depth and less breadth. The eventual chosen publisher provided an answer. They told the committee that their curriculum was a spiraling curriculum—every topic was covered at every grade level and as students spiraled up the curriculum their understanding would increase.

Tony: Did the publisher say, basically, here's this spiraling idea?

Barbara: Yes. Yes.

Tony: Is there a research base that the publisher used ...

Barbara: Oh my gosh. They provided that information for us and again our teachers on the committee did their own research and brought it in ...

And Jean:

Tony: You know that's interesting because that really is not the way the National Science Standards talk about things. They're still saying it's a problem when it's an inch deep and a mile wide. We want fewer subjects taught in more depth and you have this curriculum not necessarily doing that?

Jean: The National Standards want depth taught but no, this is not ... it's following standards but it's not in depth from everything that I'm seeing. It's not in depth.

I may go in depth on one subject that has been touched upon in K, 1, 2. Fourth grade will go in depth on a different subject that has been touched on 2, 3 you know? Fifth grade may go really in depth on something that they had in 2nd, 3rd, and 4th. So in that respect, yes, everything that we are teaching is not in depth but it is almost like a whet your appetite, so by the time, like, by the time kindergartners get up here, by the time they are doing the butterflies, they are like 'we saw that one' ... well now we are learning that you need a male and a female butterfly and there's no way without a male and a female that the eggs can be fertile. They are not learning that in kindergarten, you get more added to it each year.

And Abby:

The curriculum that we adopted really does not do that. It is the same topics year after year after year and don't go as deep. You go ... you know it's a spiral, so we just keep going around. So really, if we did it again, I don't think we should spend a whole lot of time talking about ... we spent almost a year talking about what we were looking for and then when we saw the different series, none of these were exactly what we had talked about so we kind of had to readjust what we were thinking.

The committee did have to explain to teachers why the two text series chosen did not match the district goals of more depth:

In the beginning there was some discussion of a few teachers, especially in the second grade,

that didn't like that there was so much to cover and they thought we agreed that we were going to go deeper and do fewer topics. I told them the knowledge would get in depth but that you needed the knowledge here to get to there. I think it is more developmentally appropriate as far as the depth goes. (Sharon)

A Problem Solved

The publishers did ease the minds of the committee members by relating the spiraling curriculum to the state testing.

This is the first time ever that 3rd grade has ever had simple machines. Now, simple machines were always massively in-depth done in 5th grade. Okay, ISAT had simple machines on it and 4th grade takes it [the ISAT science test]. Now simple machines are in 3rd grade, it's in 4th grade, it's in 5th grade. But it is enough in 4th grade ... we just touch upon it a little bit, they go into it deeper in 4th grade but they go into it deeper in 5th but they've got enough to ... you know, answer the [ISAT] questions. It's exposed them enough so that they can figure out the answers on the ISAT. So, is the curriculum developed around the ISAT? (Barbara)

Sharon concurred:

That was something Jean mentioned, that we were taking a chance before when the kids were taking their test in fourth grade they may not have had something, but this curriculum where you hit everything a little bit at least you are assured that everything is getting hit.

Committee members' anxiety was further eased by how informed the sales staff were.

Tony: So the idea going in was that the curriculum would be in depth, more a mile deep and inch across than the other way around?

Abby: Right and then as we got more into it the different series were really not doing that as much and we put our trust that they [the publishers] knew what long-term was more effective with the kids. We figured they had studied it.

District-Wide Teacher Input

Having narrowed the curriculum choices to two text series the committee was ready to gather input from teachers. Barbara asked the publishers to make presentations to all elementary teachers, being adamant that the publishers only include in their presentation that which the district agreed to purchase. Barbara did not want teachers to see components of the curriculum they were not going to receive.

The committee developed an instrument for teachers to use in evaluating the final curriculum choices. Teachers would attend sessions and fill out the survey; the committee would tally responses of the surveys and use this data in their deliberations to choose a curriculum. No operational definitions were given for terms listed on the form. For example, "appropriate resources," "hands-on involvement" or "rubrics that are easily accessible" were not explained. There also was a proviso to teacher participation:

The teachers had to attend both [presentations] in order to give

a vote. And, again, that was because of past practice where they didn't have to attend both they would attend only one and vote for the one, which seemed ludicrous to me. Though I have to tell you that created a furor within the district because it's the first time anyone said "you're not voting unless you're there for both. This was an after school activity so they were giving up their own time to attend and they weren't paid to attend and we're a pretty union strong district but we held fast on that issue and attendance was taken and your evaluation had to have your name on it and, um, we were very secure in the fact that only people who attended both of the showcases were allowed to provide input into which was actually the best series for our district. (Barbara)

Teachers were upset that their opinions did not count unless they attended both presentations. It also meant that the committee had much less teacher participation.

The problem was when we put the survey out, it went after school and not very many people went. So there wasn't as big of a turn out for that and then later people were upset that they didn't get to vote. (Abby)

Less than 30 teachers of a population of more than 260 elementary classroom teachers attended both presentations and whose evaluation data was tallied. There were 19 open-ended comments from the teachers. Most positive comments focused on two main topics: reading level, particularly the leveled readers and vocabulary (15 responses), and the equipment tubs for

the activities (5 responses). Only one of the comments mentioned standards alignment but negative comments about both curricula included overly simplistic activities (2 responses), the number of topics to be covered (5 responses). One second grade teacher did remind the committee that the curricula presented strayed from their original intent:

I have concerns about both sets of science materials. First, I was under the impression that we had a goal to teach fewer science topics, but more in depth. Both of the science series we looked at include a little information about a lot of topics. I recall hearing about recent research on science education that supported the concept of fewer topics, more study in depth. Second, I know that our guiding principles for curriculum are to align our curriculum to state standards for our grade level, and to use resources that support the standards. With a science series that is so highly structured and "basalized" it will be almost impossible to avoid teaching lessons that are straight from the textbook, beginning to end. This gives me the sense of teaching the text, as opposed to teaching science and teaching children. I appreciate the work of the committee, and I appreciate the opportunity for all teachers to see the materials. I do wish there had been more opportunities for dialogue with all teachers throughout the process. Thank you.

The new text series was chosen shortly thereafter. The series includes student textbooks; teachers' guides,

including CDs with worksheets and assessments; supplementary (leveled) readers for students reading above, at and below grade level; each classroom gets a cart with tubs of materials to complete activities in the textbook; and a technology component which includes online access to the text by students and parents.

Curriculum Implementation

The committee was pleased to have a curriculum that specifically addressed the Illinois Learning Standards. After all,

You know you couldn't not teach to the standards. So a new teacher or something like that, rather than them looking at the standards and saying am I doing that and then looking at their lesson plans and trying to correlate, it was already done for them. If you taught the series you were teaching to the standards and you didn't really have to constantly be checking that and writing it in your plan book which ones you were covering because it was right there for you, which we felt might be more effective in making sure those standards were covered on a regular basis. (Abby)

A New Mandate to Teach Science

We're telling them resistance is futile. (Barbara)

After adopting the new text series the committee went back and completed their curriculum maps. The maps also include what topics should be completed every grading period. Jean:

Our science committee went through and did a curriculum guide, a curriculum map, and

it says you are to cover unit A—chapters one, two, three and four in the first nine weeks. Unit B the second nine weeks and we mapped it out because if kids move they are not going to totally miss out and have an empty space because they didn't get plants and animals or something like that.

I'm laughing to myself because this is going back to twenty years ago when a child moved from one school to another we used to have to know what page students were on in each subject, what book, you know and then we got away from it because everyone was doing their own thing and now it's sort of like going back to that.

The idea is that with the new curriculum there are no excuses for not teaching science or for not keeping up. Barbara explains the new policy:

There is now a mandate in River Valley that you teach for the required number of minutes and before that was not the case. Before it was 'I teach science for 6 weeks, I teach social studies for 6 weeks'.

We have principals who were also inserviced on the teaching of science by our committee. Here are the resources, here is the grade articulation and here are the things you should be seeing in the classroom, and here are the things you shouldn't be seeing in the classroom. And so our principals went out better armed than they had been before in terms of: these are the best practices in science and this is the inservice and these are the resources. The principals have gone back to their buildings and said, honestly folks, I expect

to see this happening in my building. We spent the money so that you could do this, so that our students could experience this, I want to see it happen.

They have the resources. They have the texts. The materials that they have are unbelievable. They have tubs for every single chapter. The tubs literally have little trays that have every single thing that a student is supposed to get. The kids from kindergarten on can go to their tub, lift out their tray, take it. It's there. No excuses for not doing the activities.

The notion that a mandate from the district insisting science be taught regularly to the point of keeping up with a timeline for covering chapters in the district curriculum maps may have hardened teachers' resistance to the curriculum.

Professional Development

The publisher provided inservice sessions during the spring subsequent to the adoption. At these sessions teachers did receive their teachers' guides but it was months before teachers received their other materials. At the beginning of the school year all teachers were required to attend training sessions. The publisher returned with more inservice in the fall, providing sessions for each grade level. After these publisher sessions the Science Committee decided that more needed to be done.

What we are finding already is that our teachers respond better to professional development done by our teachers than they do by outside people. They want the outside people to come in and give them that first flush of information because they know we don't know that, but once that happens they really want it to be our people providing the professional development. They would rather us provide release time for our curriculum chairs or our technology people to really figure out the technology pieces or figure out what resources we have available in River Valley to supplement what's available through the series or the timing of the series or how best to use the series and then have them put on the professional development than have somebody come in and say this is the way you should be doing it in River Valley. Abby and Jean are looking at that piece and seeing how feasible it is. They do have two classrooms of their own and only so many days, and I know they really have people pulling at them. (Barbara)

Eventually Abby and Jean did provide more inservice opportunities during the district institute days. These sessions were offered on a voluntary basis so many teachers did not have any professional development beyond what the publisher delivered the prior spring.

Principal Inservice

Barbara felt that in order for the implementation of the new curriculum to work, and to ensure that science was actually going to be taught that principals also needed inservice.

We have principals who were also inserviced on the teaching of science by our committee. Here are the resources, here is the grade articulation and here are the things you should be seeing in the classroom, and here are the things you shouldn't be seeing in the classroom. And so our principals went out better armed than they had been before in terms of: these are the best practices in science and this is the inservice and these are the resources.

Jean described what her message to the principals was during the inservice sessions:

The other K-2 curriculum chair and I are showing, in the principal's forum, what they should look for when they are in a classroom observing and evaluating a teacher on science. And number one is they shouldn't have lessons going on for a month. If teachers spend more than a day or two on a topic they aren't doing it right.

In essence River Valley believed that the new curriculum was standards-proof and an introduction to the materials was sufficient for teachers and principals to begin implementing not only the new science curriculum, but the mandate that science would be taught every day and teachers would keep up with the pacing outlined in the curriculum maps. It also was believed that these actions and policies would be sufficient to ensure not only that science was being taught but that activities in the text would be done in classrooms because the materials were readily available. Further, all these actions and policies would be policed by principals.

Implementation Problems are Encountered

The curriculum was adopted, the spring and summer workshops were completed, and teachers began using the new curriculum. Barbara and the Science Committee met with some problems with teachers' implementation of the curriculum.

"Love Lessons"

We have some who say "I don't care what we are supposed to be doing, I'm doing butterflies!"
(Barbara)

The first issue that Barbara and the Science Committee dealt with after teachers received the curriculum and curriculum maps was teachers' reluctance to give up their favorite lessons—what Jean referred to as their "love lessons." Without any significant professional development or curriculum guidance from the district for a number of years, a laissez-faire system evolved for elementary science: Teachers did as they pleased. Many teachers did not teach science at all, many others developed their own love lessons. While both groups were reluctant to change their practices, teachers who developed love lessons loathed giving them up and were vocal in their objections.

Jean and Abby, who were running the workshops for teachers, dealt with the issue repeatedly. Abby:

We really wanted to get away from those lessons that teacher just were doing because they like to do them, which is still a problem, you know, it really isn't in their curriculum at all anymore.

Jean was known all over the district for her intensive butterfly unit (she had even created a butterfly garden

at her school), spending over a month studying all aspects of butterfly biology as her third graders observed their caterpillars morph into butterflies. She knew she could lead by example:

But that was our big thing with science that you have to let go of those "love lessons." You know, I love butterflies but we had plants first. We did raise the butterflies but we used to spend a month doing it and nothing else. Well, this time we raised them and they were in the back of the room on the science table and the kids fed them and stuff and now, when we got to butterflies and the life cycle of animals [a two-day lesson in the text] last week it was like, okay, you remember this because we saw them go from the egg and you saw them go into their chrysalis and emerge like this, but I couldn't spend the time I used to. I had to be one of them I mean I'm on the task force; I'm the science curriculum chair. I had to tell the teachers: Yes, I'm doing butterflies but I'm not spending more than a couple days on it. They [the butterflies] are in the classroom so we can see the full, you know, three or four week process. But I am not spending much time on it.

Barbara felt that once the mandate was given it was up to principals to make sure that teachers adhered to the curriculum maps:

Change is very difficult and when you have district this size. It is so easy to have a lone ranger and I know that we, in every building, and have one or two people who will say I'm just going to go in my room and do what I've always done. If you don't give principals

the information that they need to help turn that around then you have one person, then two people, then three people, then four people and then this adoption can become a nightmare because you haven't provided the principals with the information that they need.

A few months into the school year, Barbara felt as though the issue had been worked out:

We literally had teachers in tears. Tears. Very dramatic. We worked through it and all I can tell you is that there is more science being taught this year than there has been in the last few years.

Reading Level of the Text

Interviews conducted in November with Jean, Abby, Sharon and several teachers implementing the curriculum revealed that many teachers were concerned about the reading level of the textbook. In fact, Jean conceded that the reading level of the text is difficult and does not expect her students to be able to read the text on their own.

The textbook is a little difficult reading so it's not something that I say to my third graders go read pages 7-10 and answer the questions at the end. I read it with them because some of my kids couldn't read it on their own.

While variability in reading level among students in a classroom is common and to be expected, several teachers interviewed have abandoned the textbook as a source of text material and say they use the textbook only for graphics and activities. Sharon, a Science Committee member, is one teacher who relies almost entirely on the text series' leveled readers as a

source of text. The leveled readers are small booklets supplemental to the text which are at three levels—below grade level, at grade level and above grade level. Sharon described her science lessons as breaking her students into groups to read the supplemental leveled readers and then following up the group readings with a discussion. Sharon also noted that group readings of the leveled readers were “a great way to get your 30 minutes of science in.” In many classrooms it appears the science text of choice are the supplemental leveled readers.

Lack of Depth

The issue of breadth over depth in this “spiraling” curriculum did not go away with the implementation of the curriculum. There was a general sense of wonder in many teachers why the “more depth, less breadth,” which was thought to be a primary consideration in the curriculum adoption process, was so obviously not a part of the adopted curriculum. Many teachers were concerned about the lack of depth not only as an issue of student understanding but as an issue of developing and satisfying student curiosity.

They want to stop on butterflies and do everything there is to know about butterflies but students are going to get the life cycle over and over and over and they are going to get the exact same butterflies again in second grade that they had in kindergarten, you know, and go deeper and deeper, but people just want to stop and spend time on butterflies. And the kids are interested and so, you know, you could go on and on and on because they are thrilled with it - so it is hard to keep moving

through the curriculum. You have to look at those tabs - we taught some classes over the summer and tabbed the manuals to try to keep us on track, you know, you can look and make sure you are covering everything because we are a little nervous that the end of the book each year is not going to get hit. We are concerned about that. But that's not going to happen. We are going to get to the end.

To expect that teachers will implement a new curriculum with workshop overviews from the publisher and science committee chairs, along with a mandate from the district is naïve given our current level of understanding of the change process.

The Science Committee believed that every teacher, if they spend the correct amount of time on each chapter, should get through the entire text by the end of the school year. If teachers spend too much time on a topic, they will get behind and the later chapters will not get covered. In other words, despite teachers' beliefs that some topics should be treated in more depth, such an idea is contrary to the newly adopted curriculum and district curriculum maps.

Eventually teachers' unease with the notion of a spiraling curriculum in which topics were covered quickly led to teachers' objection to a curriculum that was the opposite of “more depth, less breadth.” Consequently, after

the first year of implementation, the district arranged for teachers from each grade level to meet to develop units which treated one topic each quarter in more depth. These units were developed with materials outside of the newly adopted curriculum.

Discussion and Conclusions

Several themes emerged from this study have implications for the study of curriculum adoption processes at the district level.

Mandates did not work. The notion that a mandate from the district insisting science be taught regularly to the point of keeping up with a timeline for covering chapters in the district curriculum maps may have hardened teachers' resistance to the curriculum. And, when teachers found the policy was not enforced, many quickly reverted to prior practices. Other teachers, in an effort to keep up, settled for simply reading the supplemental leveled readers.

The criteria for choosing the curriculum were malleable. The National Science Education Standards (NRC, 1996) state that “curriculum frameworks should be used to guide the selection and development of units and courses of study” (p.211). This was certainly the intent of River Valley's Science Committee, until other criteria (copyright and necessity of a text-based curriculum) rendered it impossible. Instead the committee used the adopted curriculum to fill out the maps after the fact. Determining criteria for selection and using it throughout the adoption process should not be assumed. Decisions and circumstances led the committee to abandon one of its top priorities: a curriculum with “more depth and less breadth.”

Some criteria were specious. The criteria of copyright and textbook-based curriculum effectively narrowed the curricular choices to five (and then two) very similar options. These two criteria eliminated many curricula favored by the larger education community, limiting the district to traditional textbook options of very recent vintage.

Outside resources were not considered. The committee did not investigate the science education literature for guidance of the curriculum selection process; e.g., Project 2061's curriculum analysis tools (Roseman, Kesidou and Stern, 1997). Nor did the committee consider looking to science curriculum specialists outside the district. Looking outside the district, beyond meeting state standards, never occurred to Barbara or the science committee; though relying on the expertise of the sales staff was mentioned by participants.

Few individuals were involved in the selection process. Despite more than 260 elementary teachers less than 60 of these teachers were involved in any aspect of the adoption process (30 teachers were on the science committee and 29 attended both sales presentations allowing them to fill out a survey). Perhaps some teacher resistance was a result of a lack of participation in the process. If getting member buy-in is an important part of a change process then greater effort at wider participation was needed.

Curriculum-related professional development was cursory and much of it voluntary. To those familiar with contemporary models of professional development so few professional development opportunities offered by River Valley might be surprising. Since the 1970s models of professional development such as the Concerns-

Based Adoption Model (Hord, Rutherford, Huling & Hall, 1987) have informed educators that "change is a process, not an event" (p.5); "change is accomplished by individuals"; "change is a highly personal experience"; (p.6) and teachers concentrate on meeting their own needs first and only after their needs are met do they look to the needs of their learners. To expect that teachers will implement a new curriculum with workshop overviews from the publisher and science committee chairs, along with a mandate from the district is naïve given our current level of understanding of the change process. None of the participants interviewed were able to articulate a model for professional development considered as part of the adoption process, including Barbara, Director of Elementary Education for River Valley. In the case of River Valley it seems that "wishing it can make it so" was the strategy for success. As Cannon and Crowther (1997) point out in a similar study, curricular implementation is doomed to failure without sufficient professional development.

What can River Valley's elementary science curriculum adoption teach us? The Science Committee worked very hard toward the goal of curriculum adoption; however, one year after the curriculum was implemented many teachers struggled to keep up with the pacing outlined by the science committee in the curriculum maps, and many have returned to their old ways—either ignoring science or simply using science time to read from the supplemental leveled readers. Few have adopted the curriculum as intended by the committee. Principals have done little to ensure the new curriculum is being used as intended by Barbara and the committee. To appease those

teachers upset at the lack of depth of the curriculum, additional units were developed that treat some topics in more detail. Despite the time, money and energy devoted to the adoption task the prospect remains that very little will come of these investments in terms of valuable science instruction.

Principals have done little to ensure the new curriculum is being used as intended by Barbara and the committee.

What can be done to help districts like River Valley to heed the findings of research about curriculum decision making and professional development? The curriculum adopted may preclude River Valley from changing the state of elementary science teaching in the district. Eisner (1990/1997) believes the domination of the textbook is a stabilizing factor that reduces the likelihood of change in schools. Textbooks, he says,

are designed to take no risks, and they strive to alienate no one. They are usually models of the dull, the routine, and the intellectually feckless. Typically, they are dense collections of facts that read much like the Los Angeles telephone book: a great many players, but not much plot (p.339).

Eisner further argues that "teachers with limited time for planning and little intellectual contact with their professional colleagues are unlikely to redefine curriculum content radically" (p. 339). Indeed, given River Valley teachers' complaints with the more radical social studies curriculum (i.e., requiring more work and preparation

time than the old curriculum) the science committee decided early to restrict their choices to text-based curricula.

Apple (1990/1997), discussing the curriculum deliberation process, states that:

the prominence of the standardized textbook was the result not only of rationalizing influences imposed from above or of the lure of a lucrative market for textbook publishers, but also of collective pressure from elementary teachers to change the awful conditions in which many of them worked. Overcrowded classrooms and the difficulties of planning for multi-age groups and for teaching a variety of subjects led teachers to argue for textbooks to help them. The result was a curriculum increasingly dominated by standardized—and finally, grade-specific—texts (p. 346).

Has the working lives of teachers changed appreciably in the last 30-40 years? The River Valley teachers associated with the science curriculum adoption did the committee work in addition to their classroom duties. The administration admits that the co-chairs were poorly compensated for the amount of work they did. Administrators might elevate the work of curriculum committees by providing better compensation. Maybe the adage “you get what you pay for” applies to the work done by teachers over and above their instructional time with students.

When the work of teachers changes, concomitant changes in curriculum and instructional practices might follow. The Organization for Economic Cooperation and Development (2006) reported the teaching time and

teachers’ working time for several countries. Primary teachers in the United States spend the greatest amount of time teaching even though most counties have longer school years. Primary teachers in Finland, whose scores on international tests we seek to emulate, spend considerably less time teaching and more time planning instruction. Finnish primary teachers teach an average of 680 hours per year in a 190 day school year while U.S. primary teachers teach 1080 hours per year in a 180 day school year. Little wonder U.S. teachers spend too little time researching curriculum options and desire a ready-made curriculum. [It should also be noted that the Finnish schools also do considerably less testing than their American counterparts.] Despite perennial claims by science educators that teachers need more content knowledge, more understanding of how students learn and more professional development (National Research Council, 1996), very little changes in the working life of elementary teachers. Perhaps administrators need to be at the forefront of efforts to provide elementary teachers a working environment that will allow them time in the professional day, like their international colleagues whose test scores we envy, to pursue curriculum adoptions and renewal that is valued.

References

American Association for the Advancement of Science. (1993). *Benchmarks for science literacy*. Washington DC: American Association for the Advancement of Science.

Apple, M. (1997). Is there a curriculum voice to reclaim? In D. Flinders & S. Thorton (Eds.), *The curriculum studies reader* (pp.337-341). New

York: Routledge. (Reprinted from *Phi Delta Kappan*, 1990, Vol. 71, 526-530).

Ball, D. & Cohen, D. (1996). Reform by the book: What is—or might be—the role of curriculum materials in teacher learning and instructional reform. *Educational Researcher*, 24(9), 6-8,14.

Cannon, J.R. & Crowther, D.T. (1997). An autopsy of an elementary science program implementation. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching (Oak Brook, IL, March 21-24, 1997).

Eisner, E.W. (1997). Who decides what schools teach? In D. Flinders & S. Thorton (Eds.), *The curriculum studies reader* (pp.337-341). New York: Routledge. (Reprinted from *Phi Delta Kappan*, 1990, Vol. 71, 523-526).

Kelly, M.P. & Staver, J.R. (2005). A case study of one school system’s adoption and implementation of an elementary science program. *Journal of Research in Science Teaching*, 42(1), 25-52.

Kesidou, S. & Roseman, J. (2002). How well do middle school science programs measure up? Findings from Project 2061’s curriculum review. *Journal of Research in Science Teaching*, 39(6), 522-549.

National Research Council. (1996). *National Science Education Standards*. Washington, DC: National Academy Press

Organisation for Economic Cooperation and Development (2006). *Education at a glance 2006*. Paris: Author. Retrieved March 28, 2008, from <<http://www.oecd.org/edu/eag2006>>.

Roseman, J. E., Kesidou, S., and L. Stern (1997). Identifying Curriculum Materials for Science Literacy. A Project 2061 Evaluation Tool. Based on a paper prepared for the colloquium “Using the National Science Education Standards to Guide the Evaluation, Selection, and Adaptation of Instructional Materials.” National Research Council, November 10-12, 1996.

Stake, R. (1997). Case study methods in educational research: Seeking sweet water. In R.M. Jaeger (Ed.), *Complementary methods for research in education* (pp.401-414. Washington DC: American Educational Research Association.

Stein, M., Stuen, C., Carnine, D. & Long, R. (2001). Textbook evaluation and adoption practices. *Reading & Writing Quarterly*, 17, 5-23.

Strauss, A. & Corbin, J. (1998). Basics of qualitative research: Techniques and procedures for developing grounded theory. (2nd. Ed.). Thousand Oaks, CA: Sage.

Tyson, H. & Woodward, A. (1989). Why students aren't learning very much from textbooks. *Educational Leadership*, 47(3), 14-17.

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